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Old habits die hard: Travel habit formation and decay during an office relocation

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Abstract

Workers at a pro-environmental charity in the United Kingdom were evaluated 19 months before the organisation moved its headquarters to another town, and then evaluated again one and four weeks after the move. Travel habit (behavioural automaticity) weakened immediately after the move, and this was equal for those who changed travel mode during the relocation and those who did not. In those who changed mode, habit strength for the old mode did not disappear abruptly but rather decayed over the post-move period, whilst habit strength for the new mode grew concurrently. This demonstrates that even when overt behaviour changes during a transition event, the underlying behavioural automaticity does not disappear immediately. Rather, there is a period during which habit for the new behaviour becomes established and habit for the old behaviour decays. Practical implications of these findings are discussed.

Keywords: habit, discontinuity, travel-mode choice, automaticity, behaviour change, pro-environmental behaviour

Old habits die hard: Travel habit formation and decay during an office relocation

How best to encourage ecologically sustainable behaviours is a core aim within environment and behaviour research. The ‘traditional’ approach to the causes of behaviour, and how behaviours might be modified, can be seen in such bounded rationality choice models as the Theory of Planned Behaviour (Ajzen, 1991) and Boarnet and Crane’s (2001) subjective expected utility model of travel. These accounts describe behaviour arising from deliberate evaluation of various information sources. Inherent in such approaches is the idea that the acquisition of new information about a behaviour or its alternatives could be sufficient to lead to behaviour change. However, whilst providing information or incentives has led to behaviour change in some studies (Bamberg, Ajzen & Schmidt, 2003; Kearney and De Young, 1996; Thøgersen, 2009), it is probably fair to say the majority of interventions have been largely unsuccessful in encouraging healthier or more sustainable behaviours (Graham-Rowe, Skippon, Gardner & Abraham, 2011; Möser & Bamberg, 2008; Ogilvie, Egan, Hamilton & Pettigrew, 2004; Ogilvie, Foster, Rothnie, Cavill, et al., 2007; Weenig & Midden, 1997).

To explain the difficulty of changing people’s behaviours, habit theory (Gardner, 2009; Verplanken, Aarts & van Knippenberg, 1997; Verplanken, Aarts, van Knippenberg & van Knippenberg, 1994) argues that, whereas behaviours are indeed initially the products of rational decision processes, and thus amenable to information interventions, repeatedly choosing a behaviour in a stable context can lead over time to the behaviour becoming automatic, or ‘scripted’ (Fujii & Gärling, 2003, 2005). Once this happens, the behaviour is initiated almost reflexively by environmental cues, rather than deliberate decision processes, meaning information can no longer readily have an influence (Gardner, 2009; Orbell & Verplanken, 2010; Verplanken et al., 1994, 1997). This process of automatization can be viewed as an adaptive strategy for maximizing cognitive economy: it is generally desirable to automate an effortful process that always reaches the same end-point. The risk is that, after a behaviour has become automated, circumstances or

underlying attitudes may change, such that context is now cueing a behaviour different to what the person would select if they were to revert to rational decision making and choose the behaviour afresh (Verplanken, Walker, Davis & Jurasek, 2008; Verplanken & Wood, 2006). For instance, a habitual car user may not be aware that a new and more efficient bus route would take them to work faster than the car, the reason being that habituation leads to ‘tunnel vision’, i.e., when in a strong habitual state, people tend not to seek, notice or attend to new information about alternative options (Verplanken et al., 1997).

The second key strand of habit theory, which arises essentially as a corollary of the first, is a focus on contextual discontinuities. The idea is that a disruption in behavioural context, which removes the cues automatically triggering behaviours, obliges people to revert to deliberate decision-making (Verplanken et al., 2008; Verplanken & Wood, 2006). To continue the example, our habitual car commuter might one day find the route to work is blocked for maintenance, or that their car will not start. This break in context means the commuter cannot continue their habitual behaviour, and must instead consciously reconsider – perhaps now discovering the more efficient bus route. This process was demonstrated indirectly by Verplanken et al. (2008), who found that many commuters travelled in a way incompatible with their attitudes, suggesting the commuting behaviours were in an automated state and so no longer strongly influenced by those attitudes. The exception was commuters who had recently undergone the disruptive experience of moving home, whose travel behaviour was much more compatible with their cognitions. The discontinuity apparently provided an opportunity to re-engage deliberate decision-making, allowing attitudes to influence behaviour again.

In recent years, considerable research interest has focused on exploring how such discontinuities affect behaviour in a wide variety (e.g., Genberg, Gange, Go, Celentano, et al., 2011) of behavioural domains. These discontinuities can be planned (or, at least, pre-announced), such as moving home (Bamberg, 2006; Prillwitz, Harms & Lanzendorf, 2008; Thøgersen, 2012) or having a

baby (Lanzendorf, 2010; Prillwitz et al., 2008; Ryley, 2006); or the discontinuities can be unplanned (such as a natural disaster – Graham, 2009), or otherwise lie outside the control of the traveller, such as with a road closure (Fujii & Gärling, 2003, 2005; Fujii, Gärling & Kitamura, 2001; see also Day & Cervero, 2010).

The behaviour that has been studied most in this context discontinuity field is travel mode choice, and within this body of work on how travel behaviour changes as a result of life events (often studied under the rubric of ‘mobility biography’ – Prillwitz et al., 2008; Schneider & Holz-Rau, 2013), perhaps most attention has been paid to residential relocation. This literature demonstrates that travel behaviour and personal choices about residential location influence one another bidirectionally – for example, a new job can be the trigger for a residential relocation, but this decision will be influenced by considerations of distance, time and financial costs associated with the commute (Prillwitz et al., 2008). Developing this theme, the literature suggests that travel behaviour choices following a relocation seem to be strongly influenced by physical infrastructural factors (e.g., the presence of bicycle lanes), which might only be considered after the relocation (Beenackers, Foster, Kamphuis, Titze, et al., 2012; Giles-Corti, Bull, Knulman, McCormack, et al., 2013; Krizek, 2003; Schneider & Holz-Rau, 2013). Spatial factors (e.g., where a person moves from and to – Schneider, 2006) also might predict travel behaviour better than demographic or attitudinal variables (Prillwitz et al., 2008).

At the psychological level, there are important unanswered questions about the mechanisms at work during discontinuities. For instance, previous research has not tackled the theoretically important question of what happens to old habits during a discontinuity event: is a habit broken completely by the change in circumstances, or merely temporarily suppressed? A priori, both explanations are plausible. Discovering which really happens would have implications for how behaviour-change interventions should be implemented: if habits are weakened, rather than totally broken, such that some residual level of behavioural automaticity remains, there would be a

stronger likelihood of people reverting to their old behaviours if the novelty of the new context were not maintained.

In this study we took the opportunity to study a disruptive travel event in a real-world setting. The pro-environmental charity WWF was relocating their United Kingdom headquarters from one town to another. As mentioned above, travel mode interventions have generally been relatively unsuccessful. In this context, this WWF case might provide a ‘best-case scenario’ for exploring mode change in a more sustainable direction at the time of a workplace discontinuity. Specifically, it seemed reasonable to assume that the people working at this organization were particularly motivated by pro-environmental goals; moreover, the institution put a great deal of effort into facilitating the uptake of more sustainable travel options following the relocation. This case thus represented a reasonable estimate of the upper-bound on how successful any organization could be when encouraging sustainable travel after a relocation using soft-policy measures such as information and incentives.

Our study particularly addressed the question of what happened to people’s habits – defined in terms of behavioural automaticity – in the period surrounding the relocation. Previous work by Lally, van Jaarsfeld, Potts and Wardle (2010) saw considerable variability in the time taken to form an entirely new habit – from 18 to over 250 days, depending on the behaviour. This study sought to complement Lally et al.’s findings by looking at the potential disappearance and/or re-appearance of an already established behaviour around the point of a disruptive event, rather than the formation of a wholly new behaviour. What happens to behavioural habits during disruptions was not known before this study. It was possible that the disruptive event would fundamentally break habits, such that they all but disappeared at the time of the event – at least for the subset of the people who changed their commuting mode. Alternatively, it was possible that even in those who changed to a new mode, the old habit was merely temporarily suppressed. If old habits indeed ‘die hard’, such that they are weakened rather than abruptly breaking, an implication is that sufficient overlap

between old and new contexts could lead to habitual behaviour reappearing faster than if it were formed anew. Moreover, we wanted to learn whether pre-disruption habit strength, or any reduction in habit strength at the time of transition, could predict who altered their travel behaviour and who did not. Similarly, we wished to see whether demographic or attitudinal variables might further predict whose behaviour changed and whose did not.

METHOD

The WWF relocation

In 2010, WWF announced that in September 2013 they would be moving their United Kingdom headquarters from the town of Godalming to Woking, taking possession of a new landmark building. The distance from Godalming to Woking is approximately 18 km by road, with Woking lying broadly north-northeast of Godalming. Both towns lie within the outer-London commuter belt and have rail connections – although the headquarters at Godalming was approximately 25 minutes' walk from the station versus 7 minutes' walk at Woking.

During the months between the announcement and the move, WWF took part in extensive activities to prepare staff for the relocation with a particular focus on encouraging sustainable travel after the move. Subsidy schemes were also introduced. For the first 6 months after the move, people who always travelled by train received the price difference between their old and new rail fare if this had increased; people who moved from driving to rail received the price difference between the two modes. However, the organization was not entirely prescriptive about pro-environmental travel after the move: people who continued to drive received up to £90 per month to pay parking costs at work for the first 6 months, as the new workplace, unlike the old, did not have free parking.

Design and materials

At Time 1 (19 months pre-move), participants were asked about basic demographic information

(age, gender, number of children, rough location of home, role within the WWF). We also administered the Environmental Attitudes Inventory (EAI – Milfont & Duckitt, 2010) and a short form of the self-report habit index (SRHI – Verplanken & Orbell, 2003) focused on travel mode. This comprised 4 questions focused on the automaticity of the behaviour: “Travelling by X is something that... ‘I start doing before I realise it’, ‘I do without thinking’, ‘I do automatically’ and ‘I do without having to consciously remember’” (cf. Gardner, Abraham, Lally, & De Bruijn, 2012). Each item was rated on a seven-point Likert scale with the four questions averaged to provide an overall measure of travel habit. Participants were also asked to rate, on seven-point scales, how much thought they had given to how they would travel after the move, and how much they were considering moving to a new home.

At Time 2 (1 week post-move) and Time 3 (four weeks post-move), only a measure of main travel mode and the SRHI were administered. For those who continued to use the same mode after the move as before, the SRHI was a straightforward repetition of their Time 1 measure; but those who changed travel mode during the move were specifically asked about habit for both their old and their new modes. The online questionnaire automatically adjusted the wording appropriately so that, for example, a person who had moved from car to bicycle would be asked about both these modes by name in the Time 2 and Time 3 surveys. The wording specifically asked about habit for travel to and from work, not travel in other domains. Although for some participants, this procedure meant that at Time 2 and Time 3 they were being asked to rate habit for a behaviour they no longer performed, the SRHI has previously been used successfully in similar circumstances (e.g., Lally et al., 2010).

Survey materials were distributed by email as links to an online tool. To maintain participants’ anonymity whilst allowing data from the three sampling points to be matched, unique 6-digit codes for each participant were randomly generated, and emailed to participants to enter when accessing the baseline survey. Post-move surveys used pseudo-random codes that were

matched against baseline codes to maintain anonymous details for individual participants, while including details that ensured the post-move survey specified questions for the previous mode of travel. For example, codes that began with 'A' were assigned to participants who previously used a bicycle, and specified bicycle habit strength questions in the follow-up surveys. The first, more detailed survey took approximately 15 minutes to complete; the two follow-up surveys took only around 8 minutes.

Participants

At Time 1, 211 staff members completed the survey. This represents 64% of the people who worked at WWF's Godalming headquarters at that time. At Time 2, 154 responses were received. Of these, 93 were from people who had also provided Time 1 data and 61 were from people who had not responded at Time 1. (The 118 who dropped out between Time 1 and Time 2 can be broken into 20 who left the organization before Time 2 and 98 who simply did not respond at Time 2.)

Finally, Time 3 obtained measures from 112 people. Seventy of these were people who had completed all three parts of the survey. The remaining 42 people were from the group that had first provided data at Time 2. In summary, then, 70 people (45% of the initial sample; 21% of the whole initial employee pool) provided data at all three time points. A further 42 people provided data at Time 2 and Time 3, but not at Time 1.

The whole dataset had a mean age of 40.1 and was 66.8% female. The 70 participants who provided data throughout the experiment were 58.6% women and their mean age was 38.8 years. Demographics were not available for the 42 people who only provided data post-move, as this information was only requested at Time 1.

RESULTS

Environmental concern was measured using the General Environmental Attitude Inventory (EAI)

for the full sample of 211 people at Time 1. The mean EAI score was 5.45 (SD = 0.58, 95% CI 5.36, 5.54). This is substantially higher than the theoretical midpoint of the scale, which is 4.0: $t(163) = 31.91, p < .001, d = 2.49$. This sample does, as expected, mostly comprise people with high levels of environmental concern.

Figure 1 shows the proportion of people using each travel mode at the three time points (powered two-wheelers are omitted because of low numbers). It is clear that the main change after the relocation was from car to train. Train use rose from below 19% to around 56% and remained steady at the final follow-up; car use dropped from 55% to 22.6% and then rose slightly at the final follow-up – apparently at the expense of walking and bicycling (an effect perhaps linked to the autumnal period of the move).

Table 1 provides more detail about the immediate transition, showing how the 89 people for whom we had all the necessary Time 1 and Time 2 data were travelling before and immediately after the move. If the whole sample had continued to travel as they did before the relocation, all the cells would be zero except for the leading diagonal. It is clear, looking down the post-move train column, that people shifted to the train not only from the car, but from various other modes, including a number of people who came to the train from walking and bicycling. One person moved in the other direction, from using the train to using the car.

The main question of theoretical interest concerned how habit strength would change. Figure 2 shows, for the 70 participants who provided data at all three time points, habit strength for whatever was their main travel mode at each stage. This graph shows that travel habit was weakened immediately after the move and that this happened equally for those who changed mode and those who did not. Given the unequal sample sizes at each time point, a linear mixed-effects model approach was used as a more robust alternative to split-plot analysis of variance. This confirmed that, whilst there was a main effect of Time on habit strength ($F(1,117) = 7.60, p = .007$), there was no effect of Mode Change ($F(1,66) = 0.20, p = .66$) and no Time \times Mode Change

interaction ($F(1,117) = 0.57, p = 0.45$). Holm-Bonferroni-corrected t -tests showed that, compared to Time 1, habit strength was lower at Time 2 ($t(128) = 4.22, p = .0001$) and at Time 3 ($t(122) = 2.34, p = .04$). The difference between Time 2 and Time 3 was not significant ($t(118) = 1.52, p = .13$). It seems, then, that habits weakened after the move, and this effect was equal for people who changed mode and people who did not. This means weakened travel habits alone cannot explain who changed mode.

For the people who changed travel mode after the office move, habit strength for both the old and the new mode is plotted in Figure 3. This graph shows that habit strength for the old mode had partly decayed at Time 2, one week after the move, and continued to decay further until Time 3. In contrast, habit strength for the new mode was weaker at Time 2 than had been habit strength for the old mode at Time 1, showing that using the new mode was not yet fully automated one week after the move (although, at this time, the new mode was showing a stronger habit than the old). A few weeks later, at Time 3, the new mode shows stronger habit than it did immediately after the move, albeit still not as great as it was for the old mode prior to the relocation. This suggests that it takes more than four weeks for new travel behaviours to become fully habitual (cf. Lally et al., 2010), and that it takes more than four weeks for a travel habit fully to disappear, even when that mode is no longer being used for commuting.

A linear mixed-effects model compared habit strength for the old and new modes at Time 2 and Time 3 only (as there were no Time 1 data for the new mode). There was a main effect of Mode (old v. new – $F(1,79) = 20.00, p < .0001$) but no main effect of Time ($F(1,72) = 0.12, p = .73$). Critically, there was a significant interaction, confirming that the new and old modes' habit strengths diverge between Time 2 and Time 3 ($F(1,72) = 13.72, p = .0004$). The interaction was further broken down using t -tests for the Time 2 and Time 3 data. At Time 2, the difference between the old and new modes was significant with $t(79) = 2.64, p = .01, d = 0.59$ and at Time 3 we see a substantially larger effect, confirming the divergence between the old and new habit strengths from

Time 2 to Time 3: $t(72) = 5.45, p < .0001, d = 1.27$.

Overall, then, Figure 3 shows that, in the month after the relocation, behavioural automaticity for those who changed mode showed relatively gradual changes. The discontinuity of moving offices did not break the habit of using the old mode immediately – rather, the automaticity associated with this mode began to decay, and was still partly present at Time 3. In parallel, habit strength for the new mode did not establish itself immediately and was still not completely established by Time 3.

Finally, we mentioned above that the data in Figure 3 meant that pre-move habit strength (or change therein) could not predict who changed mode and who did not, as habit strength before and after the move was the same in changers and non-changers. To further address the issue of who responded to the interventions put in place by WWF, a logistic regression predicted which employees changed travel mode between Time 1 and Time 2. Our model used as predictors age, whether or not the participant had children (dummy coded binary), amount of thought given to post-move travel at Time 1 and amount of thought given to moving to a new house at Time 1 (both rated on a 7-point scales), Time 1 travel habit strength (SRHI) and level of environmental concern (EAI). From the odds ratios in Table 2, initially it appears that only environmental concern was a significant predictor. However, it should be noted that the model as a whole was not significant $\chi^2(6) = 6.62, p = .36$. A reduced model, removing all the non-significant predictors from Table 2, showed $\chi^2(1) = 2.92, p = .09$, with the single predictor of environmental concern having an odds ratio of 2.03 (95% CI = 0.90, 4.89, $p = .10$). Overall, then, these logistic regressions hint at environmental concern predicting who changed their travel behaviour after the move, but the evidence is certainly not strong.

DISCUSSION

This study assessed the travel behaviour of a pro-environmental charity's employees as the

organization relocated its headquarters from one town to another. The lengthy run-up to the relocation saw the WWF provide information to employees to help them plan their post-move travel. The data showed that habit weakening did not predict who changed mode. They also showed that for those who changed their travel behaviour, the automaticity associated with the old mode decayed over a period of weeks and did not disappear abruptly; in the same period, automaticity for the new mode grew.

Theoretical implications

This study provides new information on the processes of habit breaking and formation after a disruptive event. Perhaps the most interesting theoretical implication comes from the data on habit strength shown in Figure 3. This builds upon the work of Lally et al. (2010) to show that travel habit established itself over a period of at least 4 weeks (approximating 20 days of twice-daily repetition for full-time employees). Our data also show what happens to disrupted habits over the same period: for people who changed their travel behaviour at the time of the move, the automaticity associated with the old mode did not show an abrupt cessation but rather decayed, with some evidence of weak habit still present four weeks after the transition. A priori, both decay and sudden cessation were plausible outcomes, so these data are useful for demonstrating which really happens. To the best of our knowledge, this is the first time habit breaking and formation have been studied simultaneously in the same sample like this. The implication is that as well as a ‘window of opportunity for change’, a discontinuity also introduces a ‘window of vulnerability to relapse’ – a certain amount of time during which the new habit is not fully established and the old habit is not fully extinguished, meaning people might easily revert to their old behaviour in the presence of appropriate contextual cues.

Our study also showed that travel habits were weakened equally after the transition for those who changed mode and those who did not. This means weakened habits alone cannot predict or

explain who changed their behaviour after the relocation. Indeed, the logistic regression analysis suggested that none of the variables at our disposal could predict this, although there were hints that environmental concern came close to having some use in this regard. It is possible that the regression can be read at face value to show that environmental concern is simply a weak predictor of travel mode change (cf. Thomas & Walker, 2014); but it is also possible that this sample, which was high in environmental concern, showed a ceiling effect that rendered this measure a poorer predictor of change than it would be in the wider population. Further work could usefully address this question by exploring environmental concern as a predictor of response to a transport mode-change intervention at a time of disruption for a less environmentally committed sample.

Finally, the fact that we could not predict who changed mode after the move seems to support prior claims from the geography and planning literature that spatial and infrastructural factors are a bigger determinant of travel behaviour after a disruptive event than internal cognitions or sociodemographic variables (Beenackers et al., 2012; Giles-Corti et al., 2013; Krizek, 2003; Prillwitz et al., 2008; Schneider, 2006; Schneider & Holz-Rau, 2013). Typical of these prior studies would be Beenackers et al. (2012), who found that whether a person started bicycling after a relocation depended far more on the presence of bicycle infrastructure than it did on intentions or attitudes to bicycling. Whilst the present study did not directly assess spatial and infrastructural factors, the finding that demographic and attitudinal variables were poor predictors of behaviour change at least lends further indirect support to these claims that the physical environment is of prime importance in travel actions. In particular, the fact the relocation substantially reduced the walking time between the office and the rail station might plausibly have had an influence on the uptake of rail.

Practical implications

Practitioners with an interest in workplace travel-mode interventions – or any other behaviour-

change intervention – might take a couple of suggestions from this study. First, it shows that a substantial reduction in driving *is* possible after a large workplace disruption, as the proportion of car trips approximately halved following the relocation. Whilst this study does not allow us to make definite statements about the role of the organization’s values and preparatory actions in post-move travel behaviour, given there was no comparison condition, it seems likely, given the WWF’s efforts and the high environmental commitment of its staff, that what we see in this study is a reasonable estimate of the maximum extent to which driving reduction is possible after a major workplace disruption in the present context. Given a quarter of staff in this ‘best case’ were still driving private cars after the relocation, expectations about other populations should perhaps be very modest indeed.

Second, the diverging habit seen between Time 2 and Time 3 in Figure 3 suggests that a behavioural intervention of this sort requires continued support for some time after a transition. After four weeks, old habits had not completely died away and new habits were not fully established. Given habit theory’s claim that context cues behaviour, this suggests there would be some propensity for people to revert to their old behaviours even after 4 weeks if circumstances triggered those behaviours. At a practical level, then, the study suggests that a workplace travel intervention needs to provide support – ideally of a form that keeps behavioural context different from what it was before the intervention – for at least 4 weeks to allow time for the old habit to decay and the new to establish sufficiently. Within this window, it is likely that people could revert to their old behaviours in the presence of the appropriate contextual triggers. Measures might be conceived to support the new habit and jeopardise the old one, such as limiting available parking spaces.

It seems probable that similar processes would be observed, and similar periods of support would be needed for, habit and behaviour change in non-travel domains.

Strengths, weaknesses and extensions

The prime concern with this study was the high drop-out rate between Time 1 and Time 2. The main reasons for this were very likely the long time lag (over 1.5 years) between the two measurements and the fact the Time 2 survey was right in the period people were adjusting to their new workplace. These could plausibly put limits on the generalizability of the results.

The sample here was also high in environmental concern, and we cannot be certain to what extent similar outcomes would be seen in less concerned people. Whilst it is impossible to give a definite answer to this right now, we would note that the mode changes were evaluated here without regard to their environmental status. That is, we did not specifically assess the extent to which people took up *greener* travel modes after the move, merely the extent to which they took up *new* modes (Table 1 shows at least one person shifted from train to car). The results, therefore, address the general question of travel mode change at the time of a disruptive event, rather than the uptake of greener modes specifically, and so it is not certain that the high environmental concern of our sample did skew the findings of this study.

Another possible concern was that, because the relocation had already been announced when we were invited to evaluate it, there was no chance to assess travel habits and cognitions before the announcement. People might already have started to think about how they would travel in the future at the time we first surveyed them. But this arguably strengthens the argument we put forward here, rather than weakens it. If our measure of pre-move travel habit was lower than it would have been pre-announcement, thanks to people already beginning to plan their post-move travel at the time we first surveyed them, the worst interpretation is that we have underestimated the amount of habit weakening from normal baseline settings to the immediate post-move transition. Given we found this change to be substantial, the worst outcome would be that it is really more substantial than we have estimated.

Finally, we should note that the extent to which the processes involved in a workplace

disruption would translate to other disruptions is not currently clear. Unlike a home relocation, where the person in question presumably has a reasonable degree of control over when and where they move, in a workplace relocation people have little role in initiating or controlling the move (cf. Day & Cervero, 2010). This potentially raises issues of autonomy, control and perceived trust in leadership – all of which can be important subjects amongst commuters and might influence decisions about travel behaviour (Thomas, Walker & Musselwhite, 2014).

CONCLUSIONS

While taking the special nature of the sample into account, this study showed that the use of private cars did reduce considerably – from more than half of journeys to around one-quarter – when the environmental charity WWF relocated from one town to another. On the one hand, this suggests substantial travel behaviour change is possible at a time of disruption; on the other hand, as this organization potentially offered the ‘best-case scenario’ thanks to unusually high levels of environmental concern, it seems unlikely that any other relocating organization would reduce car use below the level seen here – it is not going to be possible to reduce individual driving below a certain non-trivial level, even after a major disruption in which people are extensively supported with information and incentives.

More theoretically, this study demonstrated that travel habits were weakened immediately after an organizational relocation, and that this happened equally for people who changed mode and for people who did not. For those who changed their travel behaviour, habit for the old mode did not disappear at once, but rather showed evidence of decaying over a period of weeks, suggesting there would be a propensity to revert to old behaviours if the context reverted within this period. It seems that a context supportive of the new mode would be necessary for more than four weeks for old travel habits to decay and for new habits fully to form. In line with literature from human geography, this study suggests individual demographic and attitudinal factors were relatively poor

predictors of who changed their travel behaviour after the move, and that therefore spatial and physical infrastructural considerations might be more important than information or incentives for changing how people travel.

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Table 1 – Transition matrix showing movements from one mode to another between baseline assessment and one week post-move

		One week post-move main mode							
		Bicycle	Bus	Car	Carshare	PTW	Train	Walk	Total
Baseline main mode	Bicycle	2	0	0	0	0	5	0	7
	Bus	0	0	0	1	0	0	0	1
	Car	3	1	18	2	0	26	3	53
	Carshare	0	0	2	1	0	3	1	7
	PTW	0	0	0	0	0	1	0	1
	Train	2	0	1	0	0	8	2	13
	Walk	0	0	0	0	0	6	1	7
	Total	7	1	21	4	0	49	7	89

Note. PTW = powered two-wheeler

Table 2 – Logistic regression odds ratios to predict change of travel mode between Time 1 and Time 2

	Odds ratio	95% CI	<i>p</i>
Age	1.04	0.92, 1.09	.85
Children	0.67	0.20, 2.19	.52
Time 1 travel planning	1.27	0.79, 2.09	.29
Time 1 home move plan	0.97	0.73, 1.29	.82
Time 1 travel habit	1.11	0.75, 1.65	.61
Environmental concern	2.75	1.06, 8.03	.04

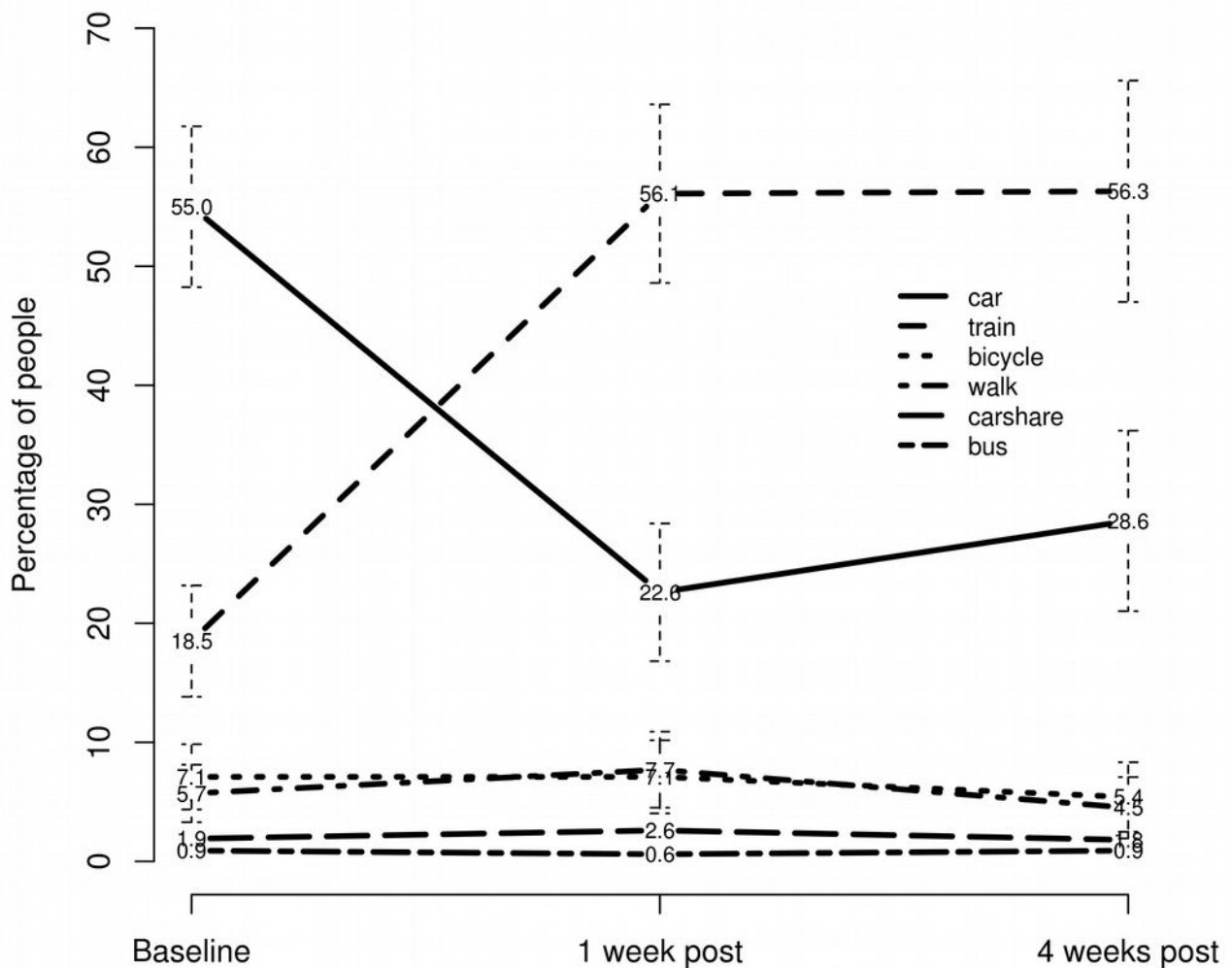


Figure 1 – Percentage of respondents using each travel mode at each time point. Error bars show 95% confidence intervals. Legend items are ordered in descending order of baseline percentage

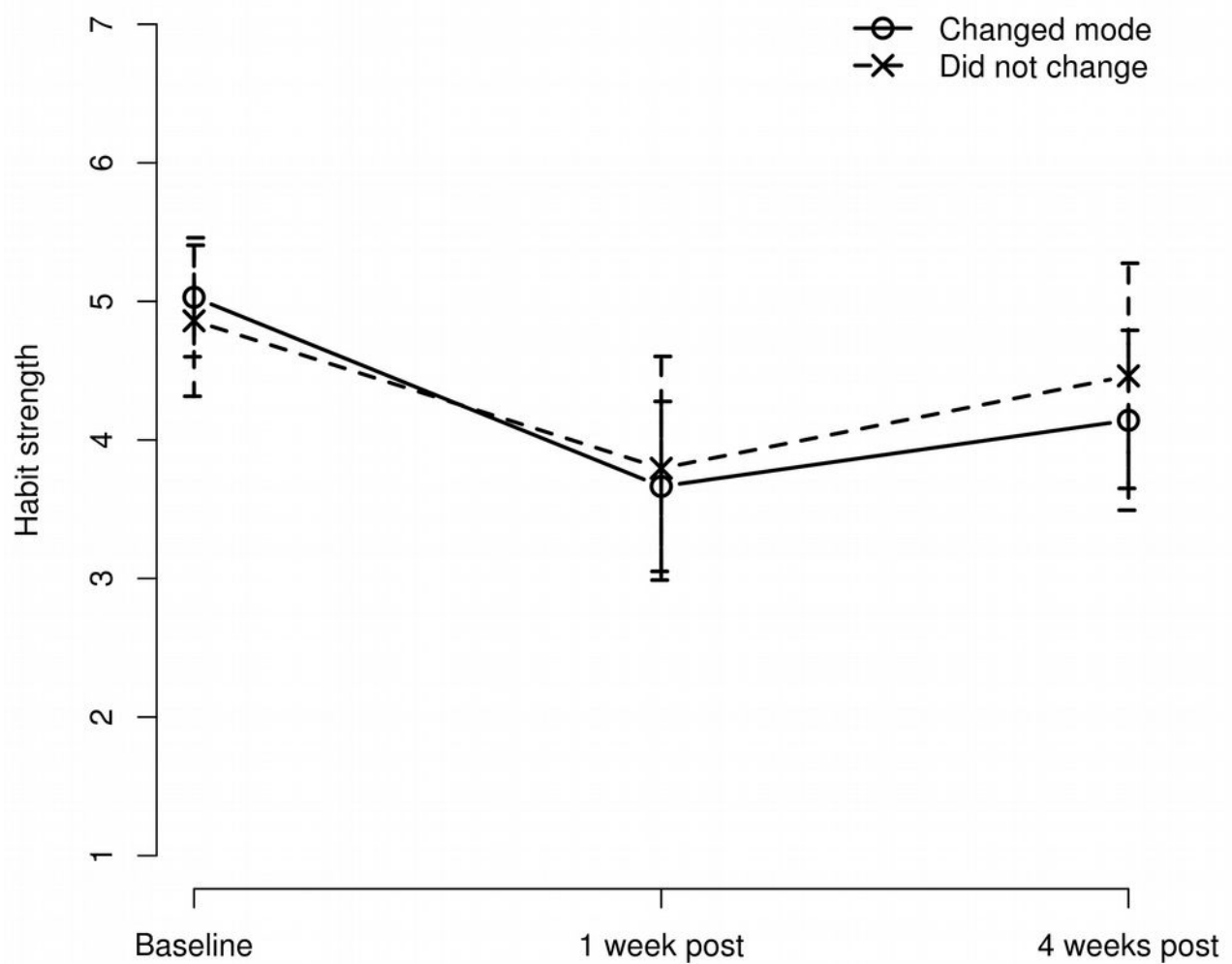


Figure 2 – Habit strength for current travel mode at each of the three time points for people who did and did not change mode. Error bars show standard errors

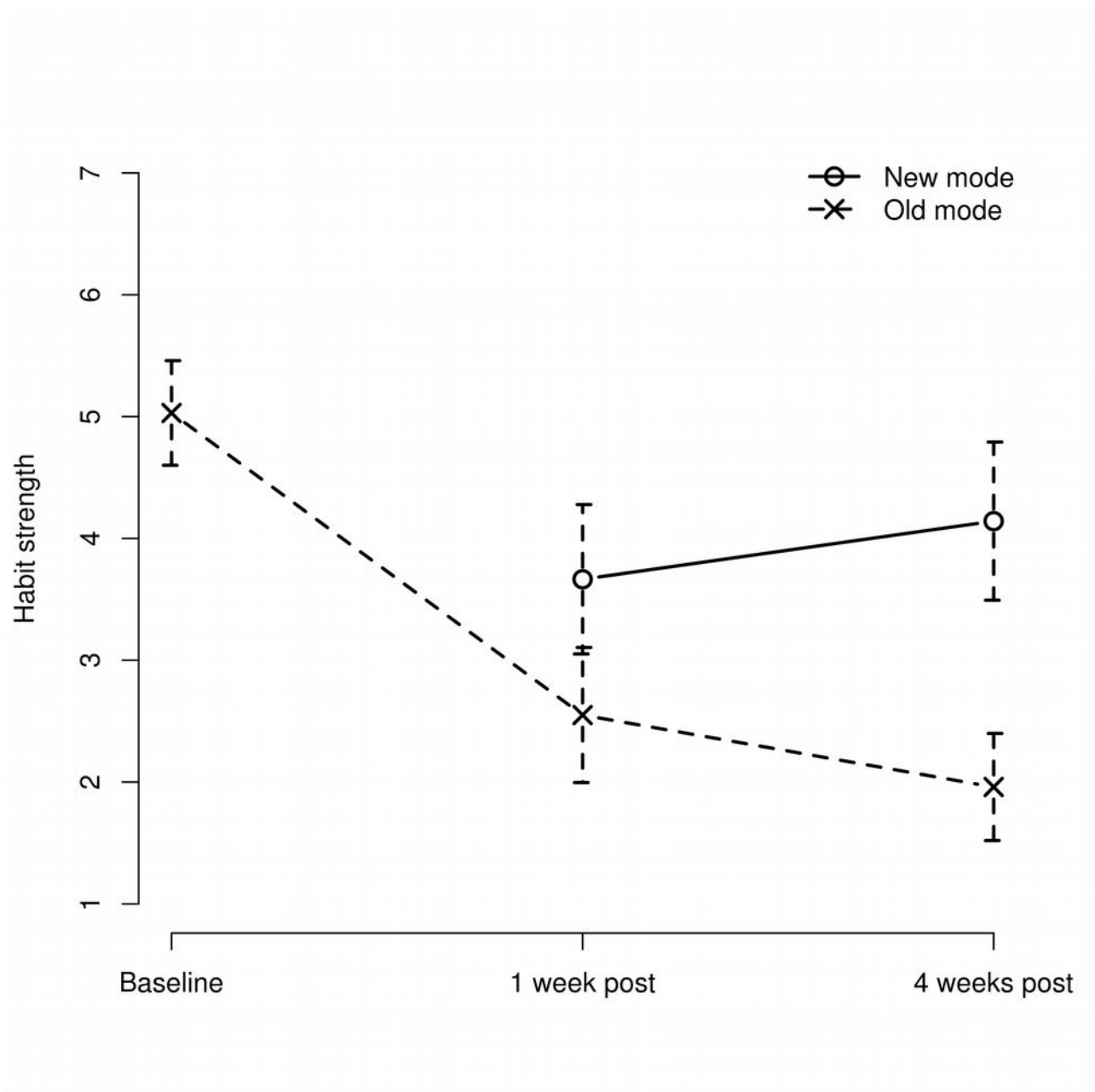


Figure 3 – Habit strength for old and new travel mode amongst participants who had changed travel mode at the time of relocation. Errors bars show standard errors